UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7
11201 Renner Boulevard
Lenexa, Kansas 66219

JUL 12 2016

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
Article Number: 7014 1200 0000 6124 9605

RECEIVED
AUG 12 2016
AWMD/EICS

Belfonte Ice Cream
1511 Brooklyn Avenue
Kansas City, Missouri 64127

Dear Sir or Madam:

The U.S. Environmental Protection Agency recently received information regarding a release of a hazardous substance at your Kansas City, Missouri, facility. As a result, the EPA is investigating the circumstances of the release, actions undertaken by this facility as a result of the release, the potential for future releases at this location and compliance with applicable statutory and regulatory requirements.

Specifically, the EPA requests information regarding the following incident:

Date	NRC Report #	Substance
July 7, 2016	1152628	Anhydrous Ammonia

This information request consists of a Chemical Release Questionnaire on the causes and effects of the chemical release as well as the status of the facility's compliance with the other sections of the Emergency Planning and Community Right-to-Know Act.

This request for information is issued pursuant to the authority of Section 104(b) and (e) of the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. 9604(b) and (e). Section 104(e) of CERCLA authorizes the EPA to require any person to furnish information about: (1) the identification, nature and quantity of materials generated, treated, stored, disposed of, or transported to a facility; (2) the nature or extent of a release or threatened release of a hazardous substance, pollutant or contaminant at or from a facility; and (3) the ability of a person to pay for or perform a cleanup.

Your response must be submitted within 30 calendar days of the date of your receipt of this request. You must fully respond to each question on the questionnaire. Refer to the definitions in the enclosed instructions for the CRQ when formulating your responses.

In accordance with the provisions of 40 CFR 2.203(b), you may assert a business confidentiality claim covering any part of the information set forth in your response which you deem confidential. Information subject to a claim of business confidentiality will be made available to the public only in accordance with the provisions of 40 CFR Part 2, Subpart B. If you fail to assert a claim of business

confidentiality at the time of submission of your response, such information may be made available to the public without further notice.

Pursuant to Section 104(e)(5) of CERCLA, 42 U.S.C. 9604(e)(5), failure to comply with a request for information issued pursuant to Section 104(e) may result in the assessment of a civil penalty not to exceed $37,500 for each day of noncompliance. Furthermore, failure to timely, accurately and completely respond to this request may subject you to further civil and criminal penalties. Information provided may be used for all purposes authorized by Section 104(e) of CERCLA.

Your completed response should be sent to:

Christine Hoard
Environmental Protection Specialist
US EPA, Region 7
AWMD/CORP
11201 Renner Blvd
Lenexa, Kansas 66219

If you have any questions, please contact Ms. Hoard at (913) 551-7775 or hoard.christine@epa.gov.

Sincerely,

Becky Weber
Director
Air and Waste Management Division

Enclosure

Enclosure 1

GENERAL INSTRUCTIONS

This questionnaire requests information to supplement reports you may have submitted to federal, state or local authorities concerning a release of a hazardous or toxic substance. The instructions below are intended to assist you in completing the questionnaire. Please read the instructions before you answer the questions. All questions must be answered. If a question is not applicable to your situation, answer N/A and proceed to the next question.

NOTE: Facility includes all buildings, equipment, structures and other stationary items which are located on a single site or on contiguous or adjacent sites which are owned or operated by the same person (or by any person which controls, is controlled by, or under common control with such person). For purposes of emergency release notification, the term includes motor vehicles, rolling stock, and aircraft.

DEFINITIONS

Please refer to the definitions below to clarify the precise meaning and use of the terms in the questionnaire.

By-pass: A piping system designed to provide an alternate pathway for gas or liquid streams that detours around a normal pathway. A by-pass condition refers to a systems operation using available by-pass systems. Certain instrument control alarms and interlocks may also be by-passed during abnormal operating conditions.

Containment System: Dikes, curbs, vaults, ponds and the like which serve to collect and temporarily hold spilled materials until such time as they are removed, disposed of, or transferred to a secure storage vessel.

Equipment (Mechanical) Failure: Failure of process or storage vessels, valves, piping, pumps or other equipment connecting vessels in a process which allows a loss of containment.

Extremely Hazardous Substance: Any element, compound, mixture, solution or substance designated under Section 302 of Title III of the Superfund Amendments and Reauthorization Act.

Facility Boundary: Fence line or property line marking the perimeter of a facility.

Failure Modes/Effects Analysis: A method for tabulating the system/plant equipment and their respective failure modes (description of how the equipment or system fails). The tabulation includes the effects of each failure mode on the system/plant and a critical ranking of them.

Fault Tree Analysis: A deductive technique that focuses on determining the causes of one particular accident event. The causes are determined using the fault tree - a graphic model that displays the various combinations of equipment faults and failures that can result in an accident event.

Federal Authority: Any federal government official delegated the responsibility under the Superfund statute for activities related to hazardous substance releases (e.g., National Response Center, U.S. Environmental Protection Agency and its regional offices).

General Public: Persons not present within the facility boundaries at the time the release occurred and/or with no business association to the facility owner (e.g., residents near the facility).

Hazard Assessment: Formal procedures employed to identify potential risks that could lead to an accidental release (e.g., Fault Tree analysis).

Hazard and Operability Studies: Formal team brainstorming to systematically identify hazards and operability problems throughout an entire facility. Certain guide-words such as no flow and no cooling are used. The consequences of credible deviations associated with the guide-words are identified and assessed.

Hazardous Substance: Any element, compound, mixture, solution or substance designated under Section 102 of the Comprehensive Environmental Response, Compensation, and Liability Act or Section 3001 of the Solid Waste Disposal Act.

Human Error Analysis (also known as Human Factors Analysis): A systematic evaluation of the factors that influence the performance, procedures and techniques of human operators, maintenance staff and other personnel. It will identify error likely situations that can cause an accident.

Immediate Response: Application of equipment, systems and procedures to capture, neutralize or destroy a hazardous substance before it is released to the environment (e.g., scrubber).

Incident: A release or a threat of release at your facility.

Local Authority: Any local government official responsible for remedial or related activities connected with a hazardous substance release (e.g., Local Emergency Planning Committee, fire department).

Loss of Containment: Release of hazardous substances from a process or storage vessel, interconnecting equipment and/or control equipment to the environment.

Migration: The movement of a substance from one place to another in air, water, soil or other media.

Operator Error: A mistake (e.g., leaving a valve open, failure to respond to process alarms, failure to maintain process variables or conditions at set point) made during operation of a process by the operator resulting in a release or loss of containment.

Owner: The legally designated individual, partnership or parties that own the facility.

Probabilistic Risk Assessment: The overall measure of risk determined through numerical evaluation of both accidental consequences and probabilities. This method is used to assess comparative risk where alternative designs exist.

Process Control and Monitoring: Control and detection equipment that provide information on the process status, standard operating conditions or parameters, and possible or imminent releases (e.g., pressure sensors, temperature sensors, chemical detectors on process lines).

Process Design: Design of process equipment and systems to limit the potential for accidental releases

(e.g., redundant systems).

Process Vessel: A tank, reactor, vat or other piece of equipment in which substances are blended to form a mixture, or are reacted to convert them to some other product or form.

Release: Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing (including the abandonment or discarding of barrels, containers and other closed receptacles) of an extremely hazardous or hazardous substance into the environment from a storage or process vessel.

Responding Official: Person responsible for the final review of the information provided in the survey questionnaire for completeness and accuracy, (e.g., facility safety officer, environmental engineer, plant manager).

Response: Application of equipment, systems and procedures to capture, neutralize or destroy a hazardous substance after it is released to the environment (e.g., cleanup).

Standard Industrial Classification: The federal government categories of business activity. See Standard Industrial Classification Manual, Office of Management and Budget, U.S. Government Printing Office, Washington, D.C.

State Authority: Any state government official responsible for remedial or related activities connected with a hazardous substance release (e.g., State Emergency Response Commission, state transportation office).

Storage Vessel: Any container (e.g., tank, drum, bottle, tank car, cylinder) used to hold a raw or input material, a product or a by-product at ambient conditions or at an elevated or reduced temperature or pressure.

Upset: Process deviation from standard conditions because of a malfunction or failure of process controls, alarms or backup systems. These conditions could result from operator error, mechanical or equipment failure, or from unexpected events such as fire, explosion, power loss or water loss.

What If Analysis: Considers consequences associated with events that occur as a result of failures involving equipment, design or procedures. All possible system failures are collected in a list and evaluated (e.g., what if the feed pump fails). This method requires a basic understanding of what is intended, and the ability to combine possible deviations and to reject incredible situations.

1. Definition derived from Guidelines for Hazard Evaluation Procedures, AICHE, 1985, and from the Review of Emergency Systems, EPA, June, 1988.

Enclosure 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7
11201 RENNER BOULEVARD
LENEXA, KANSAS 66219

RECEIVED
AUG 12 2016
AWMD/EICS

RELEASE QUESTIONNAIRE

Information Request Pursuant to CERCLA §104(e)

A. Responsible Party Information

Name:	Justin Jenkins
Email Address:	JJenkins@Belfontedairy.com
Website:	Belfontedairy.com
NAICS Code:	424430
Number of Full Time Employees:	44
Number of Part-Time Employees:	1
Number of Contract Employees at Time of Incident:	1

B. Mailing Address

Street:	~~1511 Brooklyn Ave~~ 1625 Cleveland Ave		
City:	Kansas City		
County:	Jackson		
State:	MO	**Zip Code:**	64127

C. Physical Address

Street:	1511 Brooklyn Ave		
City:	Kansas City		
County	Jackson		
State:	MO	**Zip Code:**	64127
Latitude (+) and Longitude (-) (if known):	39.092960 -94.555776		

☑ **Check here if incident location is the same as the Facility Physical location in Question 1.**

Otherwise, complete the following:

D. Incident Location

Street:			
City:			
County			
State:		**Zip Code:**	
Lat./Long. of Release Location:		**Milepost (if applicable):**	

E. Federal, State and Local Authorities Notified (e.g., NRC, EPA Regional Office, SERC, LEPC, Police, Fire Department, 911): Please include all notifications made by the facility concerning this release during and after the release or during multi-day releases. For multi-day events, provide information for every day of release.

AGENCY	DATE (mm/dd/yy)	TIME 24 Hour Clock (Please specify time zone)	PERSON CONTACTED
911	7-7-16	0702 ~~99~~	
EPA	7-7-16	0710 ~~99~~	
OSHA	7-7-16	0709	

F. Reporter

Provide the name, title and contact information of the individuals who made the notification to agencies listed in Question E:

Name:	Danny Sanders , Justin Jenkins
Title:	Plant Manager , QA Manager
Contact Information:	(816)-627-0423 (816)-627-0417

G. Incident Times

This section asks several questions concerning the release of hazardous substances. Provide information <u>for each substance(s) released</u>. If exact responses cannot be provided, so indicate and provide estimates using your best professional judgment. Attach additional pieces of paper, if

necessary.

	Date (mm/dd/yy)	Time (24-Hr Clock) (Specify Time Zone)
Incident Began:	7-7-16	0650 Central Standard
Incident Initially Detected:	7-7-16	0658 Central Standard
Reportable Quantity Met or Exceeded:	7-7-16	0700 " "
Incident Ended:	7-7-16	0955 " "

H. Incident Response

Agencies and Contractor(s) that Responded to Release:	Fire Department
	Ambulance

I. Substance Information

In the table below, provide release estimates for the substance(s) released (in pounds only) to each media. Quantities released to each media should add up to the total quantity released. For solutions, adjust the quantity of the substance released for substance concentration (e.g., report 1,000 lbs of 50% sulfuric acid released as 500 lbs sulfuric acid). Attach a Material Safety Data Sheet (MSDS) for each substance. <u>For multiple substances attach an additional copy of this page for each substance.</u>

		Media	Quantity/Lbs
Substance Name:	Anhydrous Ammonia	**Air:**	1,102.5
CAS #	7664-41-7	**Surface Water:**	0
DOT UN#	1005	**Land:**	0
RCRA Waste Code: (if applicable)	N/A	**Sewer to Treatment Facility:**	0
Physical State at Time of Release:	Vapor	**Total Quantity of Substance Released:**	1,102.5

a. **Is this substance reported on an EPCRA Tier II report or this facility?** ☐ **Yes** ☑ **No**
b. **Is this substance in a Clean Air Act Risk Management Program process?** ☐ **Yes** ☑ **No**
c. **Was this substance reported on your facility's EPCRA 313/TRI for the last calendar year?** ☐ **Yes** ☑ **No**

J. **Indicate As Follows:**

	Quantity/Time	Units
Average Release Rate:	24.5/min	pounds
Maximum Release Rate:	24.5/min	pounds
Estimated Amount of Material Released During the First Minute of Incident:	24.5/min	pounds

K. **Indicate the weather conditions at the time of the release. Approximations are acceptable, however, identify the source of the information.**

Source of Information:	www.timeanddate.com/weather		
Wind Speed (miles per hour):	8.078mph	**Temperature (Fahrenheit):**	91°
Wind Direction (from):	South	**Precipitation:**	Yes
Relative Humidity:	82%	**Cloud Cover:**	Yes

L. **Indicate the number of persons injured, hospitalized and fatalities that occurred as a result of the release:**

	Injuries	Hospitalized	Fatalities
Facility Employees:	0	0	0
Contractors:	1	0	0
General Public:	0	0	0
Responders:	0	0	0

M. **Indicate the number of persons evacuated and/or sheltered in-place as a result of the release:**

	Evacuated	Sheltered In Place
Facility Employees:	44	0
Contractors:	1	0
General Public:	75	0

Enclosure 3

RELEASE QUESTIONNAIRE

Information Request Pursuant to CERCLA §104(e)

This release questionnaire asks several questions concerning the release of hazardous substances. Provide information for each substance(s) released. If exact responses cannot be provided, so indicate and provide estimates using your best professional judgment. Attach additional documentation to your response to this information request where required.

1. Provide as an attachment any and all documentation regarding notification made to the agencies listed in Question E. This includes, but shall not be limited to, call logs and reports.

2. Provide any and all supporting documentation regarding times listed in response to Question G.

3. Describe how the release was initially detected.

4. Provide the calculations regarding the amounts listed in Questions I and J.

5. What actions did the facility take between the time the release was initially detected and the time that federal, state and local officials (NRC, SERC and LEPC) were notified?

6. Provide the name, title and phone number of the person who made the initial detection of a potential release. What actions were taken by this person to report the release?

7. Provide the name, title and phone number of the person who determined when the reportable quantity was reached or exceeded, as well as the date and time of that determination. What actions were taken by this person to determine the quantity of the release and the time and date he had knowledge that the release exceeded the applicable RQ:

8. Describe where the release occurred and attach a map or diagram (to scale) of your facility showing facility boundaries and buildings and identifying the location and path of migration of the release.

    a. Where did the release occur, indoors or outdoors? For indoor releases, was the entire release captured inside the building during the entire incident? If yes, explain how.

9. Did any quantity of the released material migrate off the facility boundaries: (Please note that releases to the air should be assumed to migrate off the facility boundaries.) If no, explain how this was accomplished.

10. Describe the source and causes of the release and how the release occurred.

    a. Was an accident/incident investigation performed? If so, when did it start, who performed it, and was a report written? Please attach any and all accident/incident investigation(s) and any and all supporting documentation.

11. Are substance(s) involved in this release included in any permit issued to the facility? If yes,

please list the permit numbers and who issued them.

12. Has this facility submitted a Continuous Release Report pursuant to EPCRA 304 and CERCLA 103 for this substance? If yes, what was the total annual amount of the substance(s) released in the previous year (in pounds)? If yes, what are the upper and lower bounds of the normal range of the release (in pounds or kilograms)? If yes, what is the Continuous Release case number assigned by the National Response Center (NRC)?

13. Indicate how the information listed in Question L was obtained (medical center, fire department, LEPC, facility records, etc.)

a. Please provide your facility's OSHA 300 log for the year covering the incident, if you are required to maintain one.
b. How was the number of persons evacuated and/or sheltered in-place as a result of the release obtained?

14. Did the facility receive any inquiries or complaints from off-site sources regarding the release?

15. Indicate all environmental effects that occurred as a result of the release, including but not limited to fish kills, vegetation damage, soil removal, groundwater contamination, wildlife kills, etc.

16. Estimate the dollar amount of property damage that occurred as a result of the release as follows:

a. On-site
b. Off-site

17. Was a written follow-up notice provided to the LEPC and SERC? If so, when was it sent? Please provide a copy(s) of the written follow-up notice.

18. Describe how the released material is used at your facility. What is the maximum amount, in pounds, of the released material that you have on-hand at any one time at your facility and the total manufactured or processed during the preceding calendar year?

19. What formalized hazard evaluation was performed prior to this release at the process or storage area within your facility where the accident occurred? When was it last conducted? How frequently is this evaluation conducted (e.g., every 5 years)?

a. Failure Modes/Effects Analyses
b. Fault Tree Analyses
c. HAZOP Studies
d. Human Error Analyses
e. What If Analyses
f. No evaluation ever done for this area
g. Other evaluation (describe the evaluation, indicate frequency, date completed)

20. Was the hazard evaluation performed effective in predicting a release event similar to this incident? Why or why not?

21. Has a release of the same substance occurred in the last five years?

22. Did the released material include oil of any kind or in any form, including, but not limited to petroleum, fuel oil, vegetable oil, animal oil, oily refuse and oil mixed with wastes? If yes, describe the type of oil. NOTE: A separate query may be sent by the EPA pertaining to the discharge and/or storage of oil.

23. Did the released material reach a wastewater treatment plant? Is the treatment plant on-site or off-site? If off-site, provide the name and location of this water treatment plant. If off-site, does your facility have a pretreatment permit? Please provide a copy of that permit.

24. Provide the name and location of any waterway (river, stream, creek, lake or pond) potentially impacted, including tributaries, drainage ditches or storm sewers? Was any water present in the waterway (creek, drainage ditch or storm sewer) at the time of the release?

25. What was the amount of the released material deposited on the adjoining shoreline and/or in the above-named waterway, ditch or storm sewer?

FACILITY CERTIFICATION

RESPONDING OFFICIAL

Name: Justin Jenkins

Title: Quality Assurance Supervisor

Address: 1511 Brooklyn Ave
Kansas City, MO 64127

Telephone: (816) 627-0417

E-Mail: JJenkins@BelfonteDairy.com

Signature: Justin Jenkins Date: 8-1-16

SENIOR FACILITY OFFICIAL

Under civil and criminal penalties of law for the making or submission of false or fraudulent statements or representations (18 U.S.C.§ 1001 and 33 U.S.C. § 1319(c)(4)), I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified section of this document for which I cannot personally verify the truth and accuracy, I certify as the company official having supervisory responsibility for the persons who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.

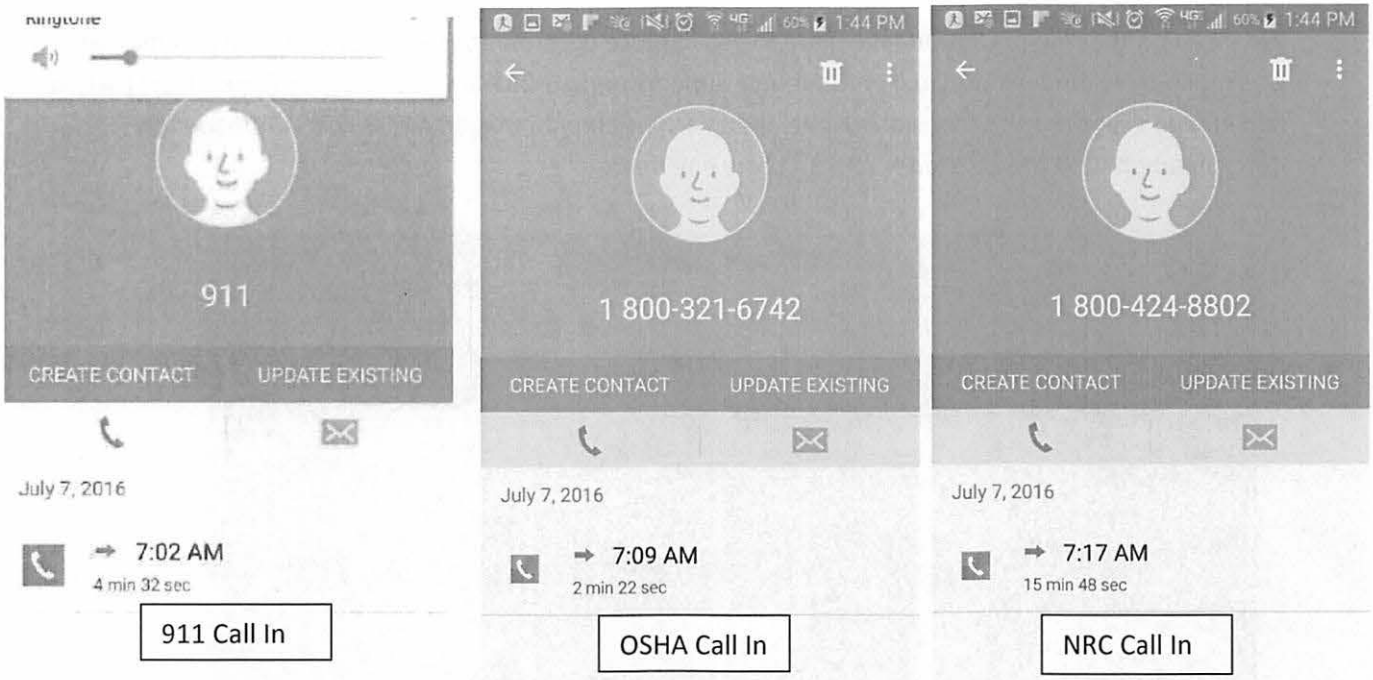
Lars D. Sanders
Name (type or print)

Plant Manager
Title

Lars D. Sanders
Signature

Release Questionnaire
Belfonte Ice Cream & Dairy Foods Company
7/07/16 Incident

1. Agency Notifications
   a) 7:02 AM Plant Manager Danny Sanders called 911
   b) 7:09 AM Quality Assurance Supervisor called OSHA
   c) 7:17 AM Quality Assurance Supervisor Justin Jenkins called the National Response Center



2. Supporting documentation regarding incident time table

See attached: "Customer Activity Report" from our security company. This indicates when they began receiving high pressure alarms in our system, not when the actual safety valve released.

3. Describe how the release was initially detected.

   The 3rd party raw milk driver initially observed the release. Prior to this, the maintenance department was responding to high pressure alarms. Plant Manager Danny Sanders officially confirmed the release.

4. Provide the calculations regarding the release

   See attached calculation report. Note the calculations offer pounds per minutes and were applied to the estimated 45 minute release duration.

5. Actions facility took between detection of release and agency notifications.

The facility was evacuated and the contractor was administered first aid.

6. Name, title and phone number of person that made initial detection.

Danny Sanders: Plant Manager – 816-508-9411. He confirmed the release and administered first aid to the raw milk driver.

7. Name, title and phone number of the person who determined a reportable release.

We erred on the side of caution and made the call before determining the precise quantity. Initial call was made by Justin Jenkins, Quality Assurance Supervisor, 816-231-2000. It was confirmed later that we had indeed exceeded the reportable limit. Karl Farris, Safety Manager, 417-862-9311, made this determination with the assistance of a 3rd party engineer.

8. Describe where the release occurred and the location and migration of the release.

The red arrow indicates the release point while the gold arrows indicates the direction of its migration path. Initially the wind was blowing to the North, then it shifted directions and blew to the East

8a The entire release occurred outdoors.

9. Did any quantity of the released material migrate off the facility boundaries?

The visible cloud was contained on site, however as it dissipated it could be detected by smell at the post office directly north of the facility.

10. Describe the source and causes of the release and how the release occurred.

There was a power outage due to inclement weather which caused unforeseeable electrical damage to our ammonia controls. During attempts to startup the system, there was an over-pressure that lifted the safety relief valve on a raw milk silo.

10-a Was an accident/ incident investigation performed?

A formal incident investigation was initiated the same day of the release. The investigation was led by the Corporate Safety Manager assisted by the plant manager and quality assurance manager. A written report was generated. See attached

11. Are substances involved in this release included in any permit issues to the facility?

No, none for anhydrous ammonia

12. Has the facility submitted a continuous release report pursuant to EPCRA 304 and CERCLA 103 for this substance?

No

13. Indicate how the information listed in Question L was obtained?

It was obtained through KU Medical Center.

A. See attached

B. A head count was performed for our facility and the post office was contacted to obtain their numbers.

14. Did the facility receive any inquiries or complaints from off-site sources?

Yes, the post office north of the facility could smell ammonia.

15. Indicate all environmental effects that occurred or resulted from the release?

None.

16. Estimate the dollar amount of property damage that occurred as a result of the release as follows:

16a-On-site: None.

16b-Off-site: None

17. Was a written follow-up notice provided to the LEPC and SERC?

No.

18. Describe how the material is used, maximum amount in pounds and total manufactured or processed:

Anhydrous ammonia is used as a refrigerant. Facility has a maximum capacity of 8,976.76lbs. The ammonia is neither manufactured nor processed.

19. What formal hazard evaluation was performed prior to this release?

A refrigeration/ ammonia safety inspection and hazard evaluation was conducted on 9/25/15. These reviews are done annually.

20. Was the hazard evaluation effective in predicting a release event similar to this incident?

The hazard evaluation did not reflect or anticipate this specific scenario. The effect and scope of an electrical storm would be hard to predict or anticipate. What equipment would be damaged, extent of damage etc.

21. Has a release of the same substance occurred in the last 5 years?

No.

22. Did the released material include oil of any kind?

No oil was released.

23. Did the released material reach a wastewater treatment plant?

No

24. Provide the name and locations of any waterways.

No waterway was affected. The release was airborne.

25. What was the amount of the released material deposited on adjoining shorelines and/or any above named waterways etc.

Not applicable.

Kansas City, Missouri

AMMONIA REFRIGERATION PROCESS
PROCESS SAFETY MANAGEMENT PROGRAM

INCIDENT INVESTIGATION FORM

Location: 1511 Brooklyn Ave

Date/Time of Incident Investigation: 7/7/16 1400

Date/Time of Incident: 7/7/16 0655

Did the Incident result in injury? Yes

How long was employee(s) involved on duty prior to incident? NA

Name(s) of Injured	Time in Position	Employee Status
Will Sebane	NA	Full Time, Regular
		Supplemental
		Temporary
		Contractor

Nature of Injury and Part of Body: Ammonia Burn --- Face and eyes.

Severity of Injury (check all that apply)

Fatality

X Medical treatment

First aid

X Lost work days-days away from work

Lost work days-days of restricted activity

If medical treatment or first aid was received:

Where: KU Medical Center By Whom: Physician

Specific location of incident: South exit of milk receiving bay.

Describe how the incident occurred including the work activities at the time of the incident of those involved:

The plant experienced a power outage due to a severe thunderstorm. The storm caused unforeseeable damage to our ammonia control systems. When the power returned we were unable to shut the system down causing excessive pressure buildup. Once the pressure became too high, a safety relieve valve attempted to release some of the excess pressure. This occurred above the milk receiving bay. The milk hauler who was in the receiving bay at the time smelled the ammonia and attempted to exit the receiving bay outside. This exit led him directly into the area of the greatest release where he walked through an ammonia cloud.

Incident Sequence (describe in reverse order of occurrence series of events preceding the incident):

A. Injury Event: Driver walked into an ammonia cloud.

B. Incident Event: Lines over pressurized and tripped a safety release valve.

C. Preceding Event #1: Were unable to shut the system down due to damage caused by the thunder storm.

D. Preceding Events #2, #3, etc: Lost power due to inclement weather.

Employee was working:

X Alone With crew or fellow worker Other (specify) _____

Supervision at time of incident:

Directly supervised X Not supervised Indirectly supervised

Causal Factors (events and conditions that contributed to the incident):

The plant experienced a power outage due to a severe thunderstorm. The storm caused unforeseeable damage to our ammonia control systems. When the power returned we were unable to shut the system down causing excessive pressure buildup. Once the pressure became too high, a safety relieve valve attempted to release some of the excess pressure by venting excess ammonia out of the system.

Corrective Actions (those that have been or will be taken to prevent reoccurrence):

Contractors were called in to repair the damaged caused by the storm and to help prevent damage of this type from reoccurring.

Signatures			
Investigation Team Leader:	Justin Jenkins	Justin Jenkins	Date 7/7/2016
Supervisor:	Danny Sanders	Danny Sanders	Date 7/7/2016

Names and Titles of other team members:

Karl Farris – Corporate Safety Director

Customer Activity Report

All Activity
BELFONTE ICE CREAM - AMMONIA
Customer ID: A1000299
07/07/2016 05:00:00 Thru 08/01/2016 23:59:59
[Customer's Local Time Zone]

A1000299 **BELFONTE ICE CREAM - AMMONIA**
(816) 483-9070

1511 BROOKLYN
AMMONIA SENSORS
KANSAS CITY MO 64127

Date	Day	Time	Log Description
07/07/2016	Thu	05:34:02	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:34:51	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:34:51	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:35:21	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:43:19	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:43:19	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:44:55	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:44:55	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:45:54	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:45:54	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:46:33	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:46:33	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:47:18	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:47:18	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:47:49	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:47:49	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:47:49	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:48:23	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:48:23	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:48:53	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:48:53	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:49:28	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:49:28	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:49:58	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:49:58	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:50:27	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:55:52	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:55:52	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:56:33	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:56:33	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:57:12	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:57:12	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:57:49	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:57:49	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:58:59	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:58:59	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:59:40	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		05:59:40	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		06:15:30	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		06:15:30	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		06:16:08	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		06:16:08	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		06:16:38	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		06:16:38	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'
		06:17:08	GAS 7 'INTERMEDIATE ACCUMULATOR-HIGH'
		06:17:08	RESTORE 'INTERMEDIATE ACCUMULATOR-HIGH'

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JKMI
REFRIGERATION, MECHANICAL, ENGINEERING

BELFONTE
Ice Cream & Dairy Foods Company
Family Made In Kansas City

AMMONIA INVENTORY CALCULATION

JKMI LLC 714 SE GRAND • FAUCETT MO 64448 PH 816-351-1084 • FAX 866-594-8926

SUMMARY PAGE

CUSTOMER
BELFONTE ICE CREAM KANSAS CITY, MO

DATE
7/18/2016

THE BELOW CALCUATIONS ARE ESTMATES ONLY AND ARE BASED ON ACTUAL FIELD MEASUREMENTS AND PLANT DATA

ESTIMATED TOTAL AMMONIA QTY 9,097.43

SYSTEM CONDITIONS

DISCHARGE TEMPERATURE 95

SUCTION TYPE	OPERATING TEMP (°F)
HIGH SUCTION	32
LOW SUCTION	10

SUMMARY

EQUIPMENT

COOLING UNITS (QTY)	13
SUBTOTAL (LBS)	**30.53**
VESSELS (QTY)	23
SUBTOTAL (LBS)	**7,026.65**
CONDENSERS (QTY)	2
SUBTOTAL (LBS)	**296.94**

PIPING

SERVICE	TOTAL FT	LBS SUBTOTAL
CD	59.00	47.87
HPL	558.00	143.12
HG	763.00	11.55
HSD	306.00	29.14
NCG	57.00	0.18
HTRS - OF	857.00	421.36
LTRS - OF	661.00	483.00
LTRL	575.00	251.87
HTRL	419.00	163.04
DR	41.00	3.08
HSS	95.00	35.76
LSS	164.00	153.35

SUBTOTAL LBS IN PIPING 1,743.32

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PIPING DATA

PIPING INVENTORY CALCULATIONS FOR HEADERS AND PLANT PIPING:

LOCATION	SERVICE	% LIQUID OR VAPOR	NATIONAL PIPE SIZE (IN)	PIPE ID (IN)	LENGTH OF PIPE (L) (FT)	Vol. (V) = $\pi \cdot r^2 \cdot L$	LIQ./VAP. DENSITY AT SERVICE TEMP (ρ)	LBS OF NH_3 = V · ρ · %FULL
ENGINE ROOM	HSS	100%	6" SCHED 40	6.065	16.0	3.210	4.65	14.92
ENGINE ROOM	HSS	100%	4" SCHED 40	4.026	31.0	2.741	4.65	12.74
ENGINE ROOM	HSS	100%	3" SCHED 40	3.068	8.0	0.411	4.65	1.91
ENGINE ROOM	HSS	100%	2 1/2" SCHED 40	2.469	40.0	1.330	4.65	6.18
ENGINE ROOM	HPL	100%	1" SCHED 80	0.957	46.0	0.230	36.71	8.44
ENGINE ROOM	HPL	100%	1 1/4" SCHED 80	1.278	55.0	0.490	36.71	17.99
ENGINE ROOM	HPL	100%	1/2" SCHED 80	0.546	5.0	0.008	36.71	0.30
ENGINE ROOM	HTRS - OF	25%	5" SCHED 40	5.047	6.0	0.834	39.90	8.32
ENGINE ROOM	HTRS - OF	25%	2 1/2" SCHED 40	2.469	79.0	2.627	39.90	26.20
ENGINE ROOM	HSD	100%	4" SCHED 40	4.026	28.0	2.476	1.54	3.81
ENGINE ROOM	HSD	100%	3 1/2" SCHED 40	3.548	20.0	1.373	1.54	2.11
ENGINE ROOM	HSD	100%	2 1/2" SCHED 40	2.469	48.0	1.596	1.54	2.45
ENGINE ROOM	HSD	100%	2" SCHED 40	2.067	22.0	0.513	1.54	0.79
ENGINE ROOM	HSD	100%	1 1/2" SCHED 80	1.500	19.0	0.233	1.54	0.36
ENGINE ROOM	HSD	100%	1 1/4" SCHED 80	1.278	8.0	0.071	1.54	0.11
ENGINE ROOM	LSS	100%	6" SCHED 40	6.065	63.0	12.641	7.32	92.56
ENGINE ROOM	LSS	100%	5" SCHED 40	5.047	12.0	1.667	7.32	12.21
ENGINE ROOM	LSS	100%	4" SCHED 40	4.026	11.0	0.973	7.32	7.12
ENGINE ROOM	LSS	100%	3 1/2" SCHED 40	3.548	41.0	2.815	7.32	20.62
ENGINE ROOM	LSS	100%	1/2" SCHED 80	0.546	23.0	0.037	7.32	0.27
ENGINE ROOM	NCG	100%	1/2" SCHED 80	0.546	8.0	0.013	1.54	0.02
ENGINE ROOM	LTRS - OF	25%	6" SCHED 40	6.065	13.0	2.608	40.92	26.68
ENGINE ROOM	LTRS - OF	25%	6" SCHED 40	6.065	55.0	11.036	40.92	112.90
ENGINE ROOM	LTRS - OF	25%	2" SCHED 40	2.067	12.0	0.280	40.92	2.86
ENGINE ROOM	LTRS - OF	25%	1" SCHED 80	0.957	29.0	0.145	40.92	1.48
ENGINE ROOM	LTRS - OF	25%	3/4" SCHED 80	0.742	39.0	0.117	40.92	1.20
ENGINE ROOM	LTRL	100%	1 1/2" SCHED 80	1.500	44.0	0.540	40.92	22.10
ENGINE ROOM	LTRL	100%	1 1/4" SCHED 80	1.278	19.0	0.169	40.92	6.93
ENGINE ROOM	LTRL	100%	3/4" SCHED 80	0.742	18.0	0.054	40.92	2.21
HALLWAY OUTSIDE OF ENGINE ROOM	LSS	100%	6" SCHED 40	6.065	14.0	2.809	7.32	20.57
HALLWAY OUTSIDE OF ENGINE ROOM	HTRS - OF	25%	6" SCHED 40	6.065	24.0	4.816	39.90	48.04
HALLWAY OUTSIDE OF ENGINE ROOM	HTRS - OF	25%	4" SCHED 40	4.026	60.0	5.305	39.90	52.92
HALLWAY OUTSIDE OF ENGINE ROOM	HTRS - OF	25%	3" SCHED 40	3.068	96.0	4.929	39.90	49.17
HALLWAY OUTSIDE OF ENGINE ROOM	HTRS - OF	25%	1 1/2" SCHED 80	1.500	82.0	1.006	39.90	10.04
HALLWAY OUTSIDE OF ENGINE ROOM	HG	100%	1 1/4" SCHED 80	1.278	39.0	0.347	1.54	0.53
HALLWAY OUTSIDE OF ENGINE ROOM	LTRS - OF	25%	6" SCHED 40	6.065	31.0	6.220	40.92	63.63
HALLWAY OUTSIDE OF ENGINE ROOM	LTRS - OF	25%	4" SCHED 40	4.026	45.0	3.979	40.92	40.70
HALLWAY OUTSIDE OF ENGINE ROOM	HPL	100%	1 1/4" SCHED 80	1.278	65.0	0.579	36.71	21.26
HALLWAY OUTSIDE OF ENGINE ROOM	HPL	100%	3/4" SCHED 80	0.742	59.0	0.177	36.71	6.50
HALLWAY OUTSIDE OF ENGINE ROOM	LTRL	100%	1 1/2" SCHED 80	1.500	56.0	0.687	40.92	28.12
HALLWAY OUTSIDE OF ENGINE ROOM	LTRL	100%	1" SCHED 80	0.957	12.0	0.060	40.92	2.45
HALLWAY OUTSIDE OF ENGINE ROOM	LTRL	100%	3/4" SCHED 80	0.742	7.0	0.021	40.92	0.86
ICE CREAM ROOM/FREEZER	LTRS - OF	25%	4" SCHED 40	4.026	112.0	9.903	40.92	101.30
ICE CREAM ROOM/FREEZER	LTRS - OF	25%	2" SCHED 40	2.067	92.0	2.144	40.92	21.93
ICE CREAM ROOM/FREEZER	LTRS - OF	25%	1 1/2" SCHED 80	1.500	8.0	0.098	40.92	1.00
ICE CREAM ROOM/FREEZER	LTRL	100%	1 1/2" SCHED 80	1.500	186.0	2.283	40.92	93.41
ICE CREAM ROOM/FREEZER	LTRL	100%	3/4" SCHED 80	0.742	8.0	0.024	40.92	0.98
ICE CREAM ROOM/FREEZER	HPL	100%	3/4" SCHED 80	0.742	86.0	0.258	36.71	9.48
ICE CREAM ROOM/FREEZER	HG	100%	1 1/2" SCHED 80	1.500	112.0	1.375	1.54	2.11
ICE CREAM ROOM/FREEZER	HG	100%	3/4" SCHED 80	0.742	49.0	0.147	1.54	0.23
MEZZANINE ABOVE INGREDIENT ROOM	HTRS - OF	25%	4" SCHED 40	4.026	27.0	2.387	39.90	23.81
MEZZANINE ABOVE INGREDIENT ROOM	HTRS - OF	25%	3" SCHED 40	3.068	58.0	2.978	39.90	29.71
MEZZANINE ABOVE INGREDIENT ROOM	HTRS - OF	25%	1 1/2" SCHED 80	1.500	10.0	0.123	39.90	1.22
MEZZANINE ABOVE INGREDIENT ROOM	HTRS - OF	25%	1 1/4" SCHED 80	1.278	27.0	0.241	39.90	2.40
MEZZANINE ABOVE INGREDIENT ROOM	HPL	100%	1 1/4" SCHED 80	1.278	71.0	0.633	36.71	23.22
MEZZANINE ABOVE INGREDIENT ROOM	HTRL	100%	1 1/4" SCHED 80	1.278	56.0	0.499	39.90	19.91
ROOF OF PLANT	HSD	100%	6" SCHED 40	6.065	19.0	3.812	1.54	5.86
ROOF OF PLANT	HSD	100%	4" SCHED 40	4.026	43.0	3.802	1.54	5.84
ROOF OF PLANT	HSD	100%	3" SCHED 40	3.068	99.0	5.083	1.54	7.81
ROOF OF PLANT	HG	100%	1 1/2" SCHED 80	1.500	432.0	5.302	1.54	8.15
ROOF OF PLANT	HG	100%	3/4" SCHED 80	0.742	46.0	0.138	1.54	0.21
ROOF OF PLANT	HG	100%	1/2" SCHED 80	0.546	37.0	0.060	1.54	0.09
ROOF OF PLANT	HG	100%	3/4" SCHED 80	0.742	48.0	0.144	1.54	0.22
ROOF OF PLANT	CD	25%	4" SCHED 40	4.026	59.0	5.217	36.71	47.87
ROOF OF PLANT	NCG	100%	3/4" SCHED 80	0.742	18.0	0.054	1.54	0.08
ROOF OF PLANT	NCG	100%	1/2" SCHED 80	0.546	31.0	0.050	1.54	0.08
ROOF OF PLANT	HTRS - OF	25%	4" SCHED 40	4.026	47.0	4.156	39.90	41.45
ROOF OF PLANT	HTRS - OF	25%	3" SCHED 40	3.068	83.0	4.262	39.90	42.51
ROOF OF PLANT	HTRS - OF	25%	2 1/2" SCHED 40	2.469	258.0	8.579	39.90	85.58
ROOF OF PLANT	HTRL	100%	1 1/2" SCHED 80	1.500	105.0	1.289	39.90	51.42
ROOF OF PLANT	HTRL	100%	1 1/4" SCHED 80	1.278	258.0	2.299	39.90	91.71
ROOF OF PLANT	DR	25%	1 1/2" SCHED 80	1.500	20.0	0.245	39.90	2.45
ROOF OF PLANT	DR	25%	3/4" SCHED 80	0.742	21.0	0.063	39.90	0.63
ROOF OF PLANT	HPL	100%	1 1/4" SCHED 80	1.278	171.0	1.523	36.71	55.93
ROOF OF PLANT	LTRS - OF	25%	3" SCHED 40	3.068	177.0	9.088	40.92	92.97
ROOF OF PLANT	LTRS - OF	25%	2 1/2" SCHED 40	2.469	48.0	1.596	40.92	16.33
ROOF OF PLANT	LTRL	100%	1 1/2" SCHED 80	1.500	177.0	2.172	40.92	88.89
ROOF OF PLANT	LTRL	100%	3/4" SCHED 80	0.742	48.0	0.144	40.92	5.90
							Total Lbs. Of Ammonia in All Piping	1,743.32

ABOVE CALCULATIONS ARE ESTIMATES ONLY

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EQUIPMENT DATA

AMMONIA CHARGE FOR EVAPORATORS:

EVAPORATOR ID AND SPECIFICATIONS	COIL MEASURMENTS				TR	LBS/TR	QTY OF UNITS	SUCTION TEMP (°F)	OPERATING AMT (LBS)
	LENGTH	WIDTH	HEIGHT	VOL					
LOAD OUT EVAP	24	18	24	0.54	1.00	0.42	1	32	0.420
ICE CREAM RACK EVAP	48	18	24	1.09	2.59	0.42	1	32	1.088
ICE CREAM PROCESSING EVAP	48	18	30	1.36	3.24	0.42	1	32	1.361
FREEZER HARDENING ROOM EVAP 1	72	20	30	1.36	3.24	0.42	1	32	1.361
FREEZER HARDENING ROOM EVAP 2	72	20	30	1.36	3.24	0.42	1	32	1.361
FREEZER HARDENING ROOM EVAP 3	72	20	30	1.36	3.24	0.42	1	32	1.361
FREEZER STORAGE ROOM EVAP 1	72	20	30	1.36	3.24	0.42	1	32	1.361
FREEZER STORAGE ROOM EVAP 2	72	20	30	1.36	3.24	0.42	1	32	1.361
FREEZER STORAGE ROOM EVAP 3	72	20	24	1.63	3.24	0.42	1	32	1.361
LOADING DOCK EVAP 1	72	20	24	1.81	3.88	0.42	1	32	1.630
LOADING DOCK EVAP 2	72	20	24	1.81	3.88	0.42	1	32	1.630
DRY STORAGE ROOM EVAP 1	48	18	24	1.81	3.24	0.42	1	32	1.361
DRY STORAGE ROOM EVAP 2	48	18	24	1.81	3.24	0.42	1	32	1.361
DRY STORAGE ROOM EVAP 2	48	18	24	1.81	3.24	0.42	1	32	1.361
ICE CREAM FREEZER UNIT 1	60	32	60	1.81	3.24	1.25	1	32	4.050
ICE CREAM FREEZER UNIT 2	60	32	60	1.81	3.24	1.25	1	32	4.050
ICE CREAM FREEZER UNIT 3	60	32	60	1.81	3.24	1.25	1	32	4.050

Total Lbs. Of Ammonia in All Evaporators 30.53

ABOVE CALCULATIONS ARE ESTIMATES ONLY

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VESSEL DATA

AMMONIA CHARGE FOR PRESSURE VESSELS

EQUIPMENT ID AND SPECIFICATIONS	% FULL	DIA. (IN)	LENGTH (FT)	VOLUME (FT^3)	Service Temp	Liq/Vap Density at Service Temp	LBS OF NH_3
RECEIVER	33%	36	16	113.112	95.000	36.7100	1,370.27
INTERCOOLER	33%	36	8.5	60.091	32.000	39.9000	791.21
RECIRCULATOR 1	33%	42	7.5	72.168	32.000	39.9000	950.23
RECIRCULATOR 2	33%	30	9	44.184	10.000	40.9200	596.65
RECIRCULATOR 2 OVERFLOW	0%	24	7.5	23.565	10.000	40.9200	0.00
OIL SEPERATOR COMPRESSOR 1	100%	18	3.5	6.186	32.000	1.5400	9.53
OIL SEPERATOR COMPRESSOR 2	100%	12	3	2.357	32.000	1.5400	3.63
OIL SEPERATOR COMPRESSOR 3	100%	12	3	2.357	32.000	1.5400	3.63
OIL SEPERATOR COMPRESSOR 4	100%	12	3	2.357	32.000	1.5400	3.63
OIL SEPERATOR COMPRESSOR 5	100%	12	3	2.357	32.000	1.5400	3.63
OIL SEPERATOR COMPRESSOR 6	100%	12	3	2.357	32.000	1.5400	3.63
OIL SEPERATOR COMPRESSOR 7	100%	12	3	2.357	32.000	1.5400	3.63
OIL SEPERATOR COMPRESSOR 8	100%	18	3	5.302	10.000	1.5400	8.17
OIL SEPERATOR COMPRESSOR 9	100%	12	3	2.357	10.000	1.5400	3.63
MEZZANINE GLYCOL TANK 2 SURGE DRUM	0%	36	6	42.417	32.000	39.9000	0.00
PLATE AND FRAME GLYCOL SURGE DRUM	50%	30	8	39.275	32.000	39.9000	783.54
SHELL & TUBE GLYCOL SURGE DRUM	50%	12	8	6.284	32.000	39.9000	125.37
CREAM TANK 1 SURGE DRUM	50%	12	3	2.357	32.000	39.9000	47.01
CREAM TANK 2 SURGE DRUM	50%	12	3	2.357	32.000	39.9000	47.01
CREAM TANK 3 SURGE DRUM	50%	12	3	2.357	32.000	39.9000	47.01
CREAM TANK 4 SURGE DRUM	50%	12	3	2.357	32.000	39.9000	47.01
CREAM TANK 5 SURGE DRUM	50%	12	3	2.357	32.000	39.9000	47.01
CREAM TANK 6 SURGE DRUM	50%	12	3	2.357	32.000	39.9000	47.01
MEZZANINE GLYCOL CHILLER # 2	100%	24	16	50.272	32.000	39.9000	2,005.85
SHELL & TUBE GLYCOL CHILLER # 3	25%	12	10	7.855	32.000	39.9000	78.35

Total Lbs. Of Ammonia in Pressure Vessels: 7,026.65

ABOVE CALCULATIONS ARE ESTIMATES ONLY

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CONDENSER DATA

AMMONIA CHARGE FOR CONDENSERS

EQUIPMENT ID AND SPECIFICATIONS	TONNAGE	LBS/TR	LBS OF NH_3
EC-1	200	0.42	84
EC-2	200	0.42	84
EC-3	100	0.42	42
EC-4	207	0.42	87

Total Lbs. Of Ammonia in Condenser Area	296.94

ABOVE CALCULATIONS ARE ESTIMATES ONLY

The Cold Front

The Electronic Newsletter of The Industrial Refrigeration Consortium

Vol. 6 No. 2, 2006

RELIEF VALVES & RELEASES

In this issue of the COLD FRONT, we discuss proper termination of pressure relief vents to safely handle the release of refrigerant through one or more pressure relief valves. We then discuss the scenarios that can result in a release of refrigerant through a pressure relief valve. We conclude with a technique that can be used to estimate the quantity of refrigerant lost from a system after a relief valve has lifted.

ESTIMATING LOSSES THROUGH RELIEF VALVES

When a relief valve lifts, refrigerant will be lost from the system. Following restoration of normal operation, determining the quantity of refrigerant that was lost during the excursion is essential.

In the last issue of the Cold Front (Vol. 6 No. 1), we introduced the concept and definition of "slope on air." Given the slope and the pressure that causes the pressure relief device to open, the volume flow of gas (air) through the relief device can be estimated as follows:

$$SCFM = slope_V \cdot \left(P_{Set} \cdot 1.1 + 14.7\ psia\right) \qquad (1)$$

where

P_{set} = relief device opening (set) pressure, psig
$SCFM$ = relief device capacity in cubic feet of standard air per minute
$slope_V$ = slope on air expressed as SCFM of air per psia

In order to effectively estimate the quantity of refrigerant lost from a system following a relief valve lifting, two important pieces of information are required: pressure in the protected component at the time of the release and duration of the overpressure situation (i.e. duration of the release). Trend logs from the system can be an important data source for quantifying the pressure of the system (or protected component) at the time of relief valve actuation. Alternatively, recording visual observations of physical gauges on or near protected components is another alternative. It is also important to realize that the inlet pressure that caused the valve to open (Pset) may differ from the actual stamped set pressure on the valve. This is the reason why trend logs can be instrumental in establishing the actual opening pressure for the valve. Another approach for determining the valve's opening pressure is to conduct a post-mortem bench test for opening pressure. This is accomplished by removing the relief valve from service

and bench testing to measure its opening pressure. Pressure relief valves involved in a release should be considered for post-mortem testing to assess function (opening pressure at a minimum).

Knowing the pressure that was sufficient to open the relief device, the valve's slope can be used to estimate the volume flow rate of gas through the valve. Keep in mind that the valve's slope is based on air flowing through the valve. Once the air flow rate through the valve is calculated, the air flow rate can be converted to a refrigerant flow rate (volume and mass) as follows (ASHRAE 15-2004 Appendix F):

$$\dot{m}_{refrigerant} = C_r \cdot \frac{C_{refrigerant}}{C_{air}} \cdot \sqrt{\frac{T_{air} \cdot M_{refrigerant}}{T_{refrigerant} \cdot M_{air}}} \qquad (2)$$

where:

C_r = estimated air mass flow rate through the relief device (lbm/min) by Equation (3)

C_a = Constant for air (356)

$C_{refrigerant}$ = Constant for refrigerant (347 for ammonia, see Appendix F for other refrigerants)

M_a = molecular mass of the air (28.97 for air)

$M_{refrigerant}$ = molecular mass of the refrigerant (17.03 for ammonia)

$\dot{m}_{refrigerant}$ = mass flow rate of refrigerant (lbm/min)

T_r = Absolute temperature of the refrigerant at flowing conditions (R)

T_a = Absolute temperature of the air (520 R)

And

$$C_r = SCFM \cdot \rho_{air} \qquad (3)$$

$SCFM$ = estimated relief device capacity expressed in ft^3/min of standard air

ρ_{air} = density of standard air at 1 atm and 60°F (0.0763 lb_m/ft^3)

Knowing the refrigerant mass flow through the valve during its operation and the duration that the valve was open, the total quantity of refrigerant lost can be estimated as shown by Eq (4). Keep in mind that the dwell period of the relief valve being open may be continuous or

intermittent. Trend logs in the output of a relief vent refrigerant detector (if equipped) or system pressures can be used to estimate the relief valve open time.

$$M_{refrigerant,loss} = \dot{m}_{refrigerant} \cdot t_{open} \quad (4)$$

$M_{refrigerant,loss}$ = total refrigerant mass loss through relief valve (lb_m)

t_{open} = total time relief valve was open (min)

EXAMPLE

A Hansen H5600R relief valve with a set pressure of 150 psig is used to protect a surge drum on an anhydrous ammonia flooded evaporator located on the roof of a plant. A power outage caused the refrigerant system to be down for an extended period of time. During the power outage, system suction pressure continued to rise due to heat gains from the surrounding warm environment. It is estimated that the relief valve on this surge drum opened when its inlet pressure reached 145 psig. The valve intermittently opened and closed during a one hour period of sustained high suction pressures until power to the plant was restored allowing compressors to operate and begin lowering suction pressure. The fraction of time the relief valve was open is estimated to be 25% resulting in a "relief valve open" dwell period of 15 minutes. Estimate the total quantity of refrigerant lost during this event.

Referring to the National Board publication NB-18, the slope for this valve is found to be 0.781. The volume flow rate of air through this valve at the observed opening pressure is calculated by Eq. (1):

$$SCFM = 0.781 \cdot (145 \cdot 1.1 + 14.7\ psia) = 136 \frac{ft^3}{min}$$

Converting the air volume flow rate to an air mass flow rate by Eq (3):

$$C_r = SCFM \cdot \rho_{air} = 136 \cdot 0.0763 = 10.4 \frac{lb_m\ air}{min}$$

The corresponding refrigerant mass flow is calculated knowing the refrigerant temperature (83°F which represents saturation temperature at 145 psig) using Eq. (2):

$$\dot{m}_{refrigerant} = 10.4 \cdot \frac{347}{356} \cdot \sqrt{\frac{520 \cdot 17.03}{543 \cdot 28.97}} = 7.61 \frac{lb_m}{min}\ ammonia$$

The total mass loss can be found by Eq. (4):

$$M_{refrigerant,loss} = 7.61 \frac{lb_m}{min} \cdot 60\ min \cdot 25\%\ open = 114\ lb_m$$

Hiland Dairy Situation:

A Henry 5601 relief valve with a set pressure of 150 psig is used to protect an ammonia component. A power outage caused the refrigerant system to be down for an extended period of time. Plant personnel encountered difficulties in over-riding the computer-controlled components. It is estimated that the relief valve opened when its inlet pressure reached 150 psig. The valve intermittently opened and closed until control of the system was restored.

Referring to the National Board publication NB-18, the slope for this valve is found to be 2.46. The volume flow rate of air through this valve at the observed opening pressure is calculated by Equation 1:

$$SCFM = slope_V \cdot \left(P_{Set} \cdot 1.1 + 14.7\ psia\right)$$

$$SCFM = 2.46 \cdot \left(150 \cdot 1.1 + 14.7\ psia\right) = 2.46\ (165 + 14.7) = 442\ ft^3/min$$

Converting the air volume flow rate to an air mass flow rate by Eq (3):

$$C_r = SCFM \cdot \rho_{air} \quad = 442 * 0.0763 = 33.7\ lb_m\ air / min$$

The corresponding refrigerant mass flow is calculated knowing the refrigerant temperature (85°F which represents saturation temperature at 150 psig) using Eq. (2):

$$\dot{m}_{refrigerant} = C_r \cdot \frac{C_{refrigerant}}{C_{air}} \cdot \sqrt{\frac{T_{air} \cdot M_{refrigerant}}{T_{refrigerant} \cdot M_{air}}}$$

$$= 33.7 * (347/356) * ((520 * 17.03) / (545 * 28.97))^{1/2}$$

$$= 33.7 * 0.974 * (8855 / 15788)^{1/2} = 32.8 * (0.560)^{1/2} = 32.8 * 0.748 = \mathbf{24.5\ lb_m\ ammonia / min}$$

Henry Technologies, Inc. (ACR) NB#: 29090
location: 701 South Main Street, Chatham, IL 62629 UNITED STATES
Nameplate Abbrev.: HENRY

Henry Technologies, Inc. (ACR)
location: 701 South Main Street, Chatham, IL 62629 UNITED STATES
Nameplate Abbrev.: HENRY

Certification Number: **29090** Design Series or catalog number: **5244-1, 5244-3/4, 5344-1, 5344-3/4, B518, B518-JT, B518-JBT**

Type Classification: **Safety Relief Valve**
Capacity Tests: **Sec. VIII Div. 1 at Phillips Petroleum on September 18, 1957**
Method of Establishing Relieving Capacity: **Flow Capacity, Slope**
Certified Value: **2.46 SCFM/PSIA**
Test Medium: **Gas**
Certified Medium: **Gas**
Set Pressure Definition: **Start-to-Leak**
Blowdown: **Fixed**

Scope of Nominal Size and Set Pressure Ranges:

Inlet Size	Outlet Size	Flow Area	Orifice [designator] diameter	Lift	Set Pressure Range	Media	Code Section
0.75 - 1.125 NPS	1, 1-1/8 NPS	0.196 sq in	0.5 in		150 - 450 psi	Air	VIII

Certification Number: **29113** Design Series or catalog number: **5601 & 5602**

Type Classification: **Safety Relief Valve**
Capacity Tests: **Sec. VIII Div. 1 at Phillips Petroleum on April 12, 1965**
Method of Establishing Relieving Capacity: **Flow Capacity, Slope**
Certified Value: **2.65 SCFM/PSIA**
Test Medium: **Gas**
Certified Medium: **Gas**
Set Pressure Definition: **Start-to-Leak**
Blowdown: **Fixed**

Scope of Nominal Size and Set Pressure Ranges:

Inlet Size	Outlet Size	Flow Area	Orifice [designator] diameter	Lift	Set Pressure Range	Media	Code Section
0.5 - 0.75 NPS	1 NPS	0.196 sq in	0.5 in	0.125 in	150 - 450 psi	Air	VIII Div. 1

Certification Number: **29124** Design Series or catalog number: **5603**

Type Classification: **Safety Relief Valve**
Capacity Tests: **Sec. VIII Div. 1 at National Board T L (Picaway) on July 20, 1989**
Method of Establishing Relieving Capacity: **Flow Capacity, Slope**
Certified Value: **2.773 SCFM/PSIA**
Test Medium: **Air/Gas**
Certified Medium: **Gas**
Set Pressure Definition: **Start-to-Leak**
Blowdown: **Fixed**

Scope of Nominal Size and Set Pressure Ranges:

Inlet Size	Outlet Size	Flow Area	Orifice [designator] diameter	Lift	Set Pressure Range	Media	Code Section
1 NPS	1.25 NPS	0.196 sq in	0.5 in		150 - 450 psi	Air	VIII Div. 1

PRESSURE RELIEF VALVES

The main function of a Pressure Relief Valve is to protect against accidental over-pressure of a pressure vessel due to system malfunction or fire.

Applications

Henry Technologies' Relief Valves are designed to be used in refrigeration systems to prevent over-pressure due to system malfunction or excessive external heat. They are to be used only with refrigerant vapor or gas, where they are typically installed on the top section of a pressure vessel, i.e. liquid receiver or suction accumulator.

Most states and municipalities which have refrigeration safety codes conform to the "American Standard Safety Code for Mechanical Refrigeration (ANSI/ASHRAE 15)". This code and ASME states that the Relief Valve setting is not to exceed the design working pressure of the vessel on which the Relief Valve is installed. The discharge capacity of relief valves varies with pressure setting. The discharge capacity required is based on the size of the vessel and the refrigerant used. See "Determining Minimum Required Discharge Capacity" section for more information, or contact Technical Support at 1-800-627-5148.

Whenever conditions permit, it is highly advisable to have the Relief Valve pressure setting (which must not exceed the design working pressure of the vessel) at least 25% higher than the normal operating pressure for the refrigerant used.

52 series Pressure Relief Valves are suitable for use with HCFC and HFC refrigerants and their associated oils, as well as other industrial fluids non-corrosive to brass, steel and Teflon.

53 and 56 series Pressure Relief Valves are suitable for use with ammonia, HCFC and HFC refrigerants and their associated oils, as well as other industrial fluids non-corrosive to steel, iron and Teflon.

How it works

All Henry Technology Relief Valves are 100% tested and manufactured to guidelines as indicated in ASME Section VIII Division 1. Every Relief Valve is calibrated to indicate a pre-determined set pressure, where the valve begins to allow gas or vapor to pass through. The valve will open to a full discharge within 10% over set pressure. After discharge Pressure Relief Valves will blow down and reseat once the pressure falls below the valves set pressure.

Main Features

- NPT and SAE flare connections
- Valves fully open before 10% overpressure when taken from the average set pressure
- Reset pressure ranges typically 10-40% (blowdown) from pop pressure
- Valves bear individual serial numbers
- UV-1 pressure test reports available upon request

Technical Specifications

All Henry Technologies PRV's have a set pressure range +/- 3% of the stamped pressure.

Set pressure range = see tables
Allowable operating temperature = -20°F to +225°F (-29°C to +107°C)

Henry Technologies' Relief Valves are stamped with the ASME UV symbol and NB to indicate National Board certification as to capacities. Additionally, Pressure Relief Valves are designed and registered for use in Canada. Please contact Technical Support at 1-800-627-5148 for CRN details and list of approved provinces and territories.

Materials of Construction

The 52 series Relief Valves have brass valve bodies. The internal parts are made of brass and carbon steel. The 53 series valves have stainless steel valve bodies. Internal parts are made from stainless steel and carbon steel. The 56 series valves have cast or ductile iron valve bodies. The internal parts are made from stainless steel and carbon steel. All valves have Teflon valve seats.

CRN

Relief Valve Capacity Ratings

Henry Technology Relief Valves are marked with a discharge capacity in unit lbs-air/min, and marked in accordance with the requirements of the ASME (Boiler and Pressure Vessel Code Section VIII, Division 1). These valves are also approved by many local refrigeration and air conditioning codes in the USA and Canada for relief of excess pressure.

HENRY TECHNOLOGIES

Angle Relief Valve - Brass							
Part No	Fig No	Conn Size (inch)		Dimensions (inch)		Orifice Diameter (inch)	Weight (lbs)
		Inlet	Outlet	A	B		
526E-XXX	1	3/8 MPT	3/8 SAE Flare	2.99	1.41	0.250	0.40

Angle Relief Valve - Steel							
Part No	Fig No	Conn Size (inch)		Dimensions (inch)		Orifice Diameter (inch)	Weight (lbs)
		Inlet	Outlet	A	B		
5600-XXX	2	1/2 FPT	3/4 FPT	2.69	1.63	0.703	3.60
5601-XXX	2	1/2 FPT	1 FPT	2.69	1.63	0.703	3.44
5602-XXX	2	3/4 FPT	1 FPT	2.69	1.63	0.921	3.40
5603-XXX	2	1 FPT	1 1/4 FPT	2.88	2.00	1.000	4.75
5604-XXX	2	1 1/4 FPT	1 1/2 FPT	4.13	2.31	1.125	6.50

Straight-through Relief Valves - Brass						
Part No	Fig No	Conn Size (inch)		Dimensions (inch)	Orifice Diameter (inch)	Weight (lbs)
		Inlet	Outlet	A		
5230-XXX	3	1/4 MPT	3/8 SAE Flare	3.16	0.250	0.38
5231-XXX	3	3/8 MPT	3/8 SAE Flare	3.16	0.250	0.39
5250A-1/2-XXX	4	1/2 MPT	1/2 FPT	4.26	0.375	0.85
5250-1/2-XXX	4	1/2 MPT	3/4 FPT	4.04	0.375	0.97
5252-3/4-XXX	4	3/4 MPT	3/4 FPT	4.05	0.375	0.95
5244-3/4-XXX	4	3/4 MPT	1 FPT	4.16	0.500	1.46
5244-1-XXX	4	1 MPT	1 FPT	4.16	0.500	1.46
5246A-1-XXX	4	1 MPT	1 1/4 FPT	5.82	0.719	2.50
5246A-1-1/4-XXX	4	1 1/4 MPT	1 1/4 FPT	5.82	0.719	2.60

Straight-through Relief Valves - Stainless Steel						
Part No	Fig No	Conn Size (inch)		Dimensions (inch)	Orifice Diameter (inch)	Weight (lbs)
		Inlet	Outlet	A		
5350-1/2-XXX	4	1/2 MPT	3/4 FPT	4.00	0.375	0.95
5352-3/4-XXX	4	3/4 MPT	3/4 FPT	4.00	0.375	1.03
5344-3/4-XXX	4	3/4 MPT	1 FPT	4.18	0.500	1.46
5344-1-XXX	4	1 MPT	1 FPT	4.19	0.500	1.46
5345A-XXX	4	1 MPT	1 1/4 FPT	5.81	0.719	2.50
5346A-1-1/4-XXX	4	1 1/4 MPT	1 1/4 FPT	5.81	0.719	2.60

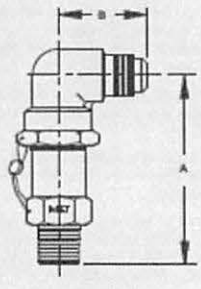

FIG 1

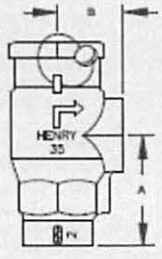

FIG 2

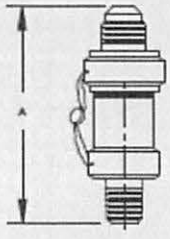

FIG 3

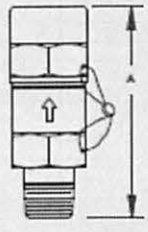

FIG 4

Order Information

1. To order, add desired pressure setting to Pressure Relief Valve part number suffix (i.e. 5230-300)
2. Pressure certificates (ASME UV-1) are available with each order for an extra charge. Specify a "-C" suffix on the part number.
3. Pressure settings outside the range stated for each model are not available. Henry only supplies relief valves bearing the NV-NB stamps.

Part No	Certified Pressure Range (PSI)	Valve Capacity Ratings (lbs. Air/min) for Brass						
		Standard Pressure Setting (PSI)						
		150	235	300	350	400	450	500
5230	150-450	5.0	7.6	9.6	11.2	12.7	14.3	N/A
5231	150-450	5.0	7.6	9.6	11.2	12.7	14.3	N/A
526E	150-450	5.0	7.6	9.6	11.2	12.7	14.3	N/A
5250A-1/2	200-500	N/A	29.0	36.5	42.4	48.2	54.0	59.9
5250-1/2	200-500	N/A	29.0	36.5	42.4	48.2	54.0	59.9
5252-3/4	200-500	N/A	29.0	36.5	42.4	48.2	54.0	59.9
*5350-1/2	200-500	N/A	29.0	36.5	42.4	48.2	54.0	59.9
*5352-3/4	200-500	N/A	29.0	36.5	42.4	48.2	54.0	59.9
5244-3/4	150-450	33.2	50.5	63.8	73.9	84.1	94.3	N/A
5244-1	150-450	33.2	50.5	63.8	73.9	84.1	94.3	N/A
*5344-3/4	150-450	33.2	50.5	63.8	73.9	84.1	94.3	N/A
*5344-1	150-450	33.2	50.5	63.8	73.9	84.1	94.3	N/A
5246A-1	150-400	70.5	107.2	135.2	156.8	178.4	N/A	N/A
5246A-1-1/4	150-400	70.5	107.2	135.2	156.8	178.4	N/A	N/A
*5345A	150-400	70.5	107.2	135.2	156.8	178.4	N/A	N/A
*5346A-1-1/4	150-400	70.5	107.2	135.2	156.8	178.4	N/A	N/A

Part No	Certified Pressure Range (PSI)	Valve Capacity Ratings (lbs. Air/min) for Steel (Stainless and Cast)		
		Standard Pressure Setting (PSI)		
		150	250	300
5600	150-450	30.9	49.9	59.4
5601	150-450	35.8	57.7	68.7
5602	150-450	35.8	57.7	68.7
5603	150-450	37.5	60.4	71.9
5604	150-450	72.0	116.1	138.1

Determining Minimum Required Discharge Capacity

ASHRAE has a guideline to determine the minimum required discharge capacity for refrigeration relief valves. Reference ASHRAE 15-2001 Section 9.7.5. Use the following equation and refrigerant factors given to determine the minimum required capacity.

C = Min. Required Capacity (lbs-air/min)
D = Outside Diameter of Vessel, **ft**
L = Length of Vessel, **ft**
f = refrigerant factor, see chart.

$$C = f * D * L$$

Refrigerant	f	Refrigerant	f
R-11	1.00	R-401A (MP-39)	1.60
R-12	1.60	R-402A (HP-80)	2.50
R-13, R-13B1	2.00	R-404A (HP-62)	2.50
R-14	2.50	R-406A	1.60
R-22	1.60	R-407C	1.60
R-113	1.00	R-408A	2.00
R-114	1.60	R-409A (FX-56)	1.60
R-115	2.50	R-410A (AZ-20)	2.50
R-123	1.00	R-500	1.60
R-134a	1.60	R-502	2.50
R-142b	1.00	R-600 (n-Butane)	1.00
R-152a	1.00	R-600a (Isobutane)	1.00
R-170 (Ethane)	1.00	R-717 (Ammonia)	0.50
R-290 (Propane)	1.00	R-744 (CO2)	1.00
R-1150 (Ethylene)	1.00	R764	1.00

Installation Notes

1. The installation location of the Pressure Relief Valve shall be above the liquid line, where the inlet to the relief valve should only be exposed to vapor or gas.
2. The Pressure Relief Valve should not be discharged prior to installation or when pressure testing the system.
3. Pressure Relief Valves should be mounted vertically.
4. Henry Technologies' Pressure Relief Valves are designed to be replaced after opening to full discharge. The set pressure after a discharge will most often be 5-15% lower than the original setting. This can be due to debris exiting the system through the valve which had deposited upon the seat disc, and altering the alignment of the internal parts.
5. Additional installation notes are shown on the instruction sheet accompanying the Pressure Relief Valve, instruction sheet drawing number 5-025-002.
6. Pressure Relief Valves should not be installed on discharge lines, as the continuous high temperatures may have adverse affects on the relief valve's performance.
7. Henry Technologies follows the recommendation provided by the International Institute of Ammonia Refrigeration (IIAR) in their Bulletin 109 "IIAR Minimum Safety Criteria For a Safe Ammonia Refrigeration System" recommends to replace Pressure Relief Valves on a five year interval. If a Pressure Relief Valve opens to full discharge it should be replaced immediately.

HENRY TECHNOLOGIES

OSHA's Form 300 (Rev. 01/2004)

Log of Work-related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

5/11/2011

Year ł 20 #

U.S. Department of Labor
Occupational Safety and Health Administration

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each *injury* or *illness* recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Form approved OMB no. 1218-0176

Establishment name Belfonte Brooklyn

City Kansas City State Missouri

Identify the person			Describe the case				Classify the case: CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness: (M)					
									Remained at work									
(A) Case no.	(B) Employee's name	(C) Job title (e.g., Welder)	(D) Date of injury or onset of illness (month)	(day)	(E) Where the event occurred (e.g., Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g., Second degree burns on right forearm from acetylene torch)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other record-able cases (J)	Away from work (K)	On job transfer or restriction (L)	Injury (1)	Skin Disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing Loss (5)	All other illnesses (6)
						Page totals	0	0	0	0	0	0	0	0	0	0	0	0

180 day cap

Must count calendar days.

Be sure to transfer these totals to the summary page (Form 300A) before you post it.

Injury (1) | Skin Disorder (2) | Respiratory condition (3) | Poisoning (4) | Hearing loss (5) | All other illnesses (6)

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

C:My Documents/OSHA log/Sketcherside 12-19-2001/UPDATE 1-12-2004

Year 2016

U.S. Department of Labor

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types

		Total number of. . . (M)		
(1)	Injuries	0	(4) Poisonings	0
			(5) Hearing loss	0
(2)	Skin Disorders	0	(6) All other illnesses	0
(3)	Respiratory conditions	0		

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Establishment Information

Your establishment name: Belfonte Ice Cream and Dairy Foods

Street: 1511 Brooklyn

City Kansas City State MO Zip **64127**

Industry description (e.g., Manufacture of motor truck trailers)

Ice Cream Manufacturing

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

5 1 4 3

OR

North American Industrial Classification (NAICS), if known (e.g. 336212)

4 2 4 4 3 0

Employment Information (If you don't have these figures, see the worksheet on the back of this page to estimate.)

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Company executive Title

(816) 231-2000 / /

Phone Date